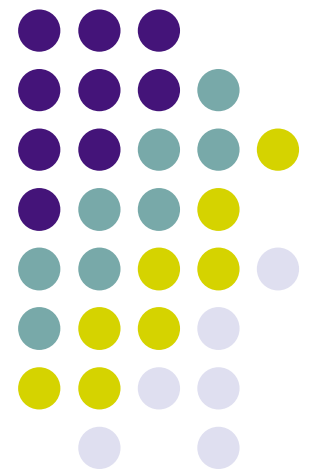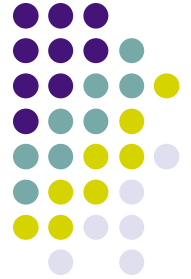# Workflow Overview

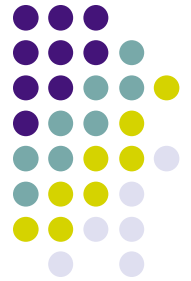NASA SIVO Code 610.3

Meeting with GMAO

Feb 14, 2007

Outline

- Overview of the Workflow system
- Demos
  - NED (Workflow configuration)
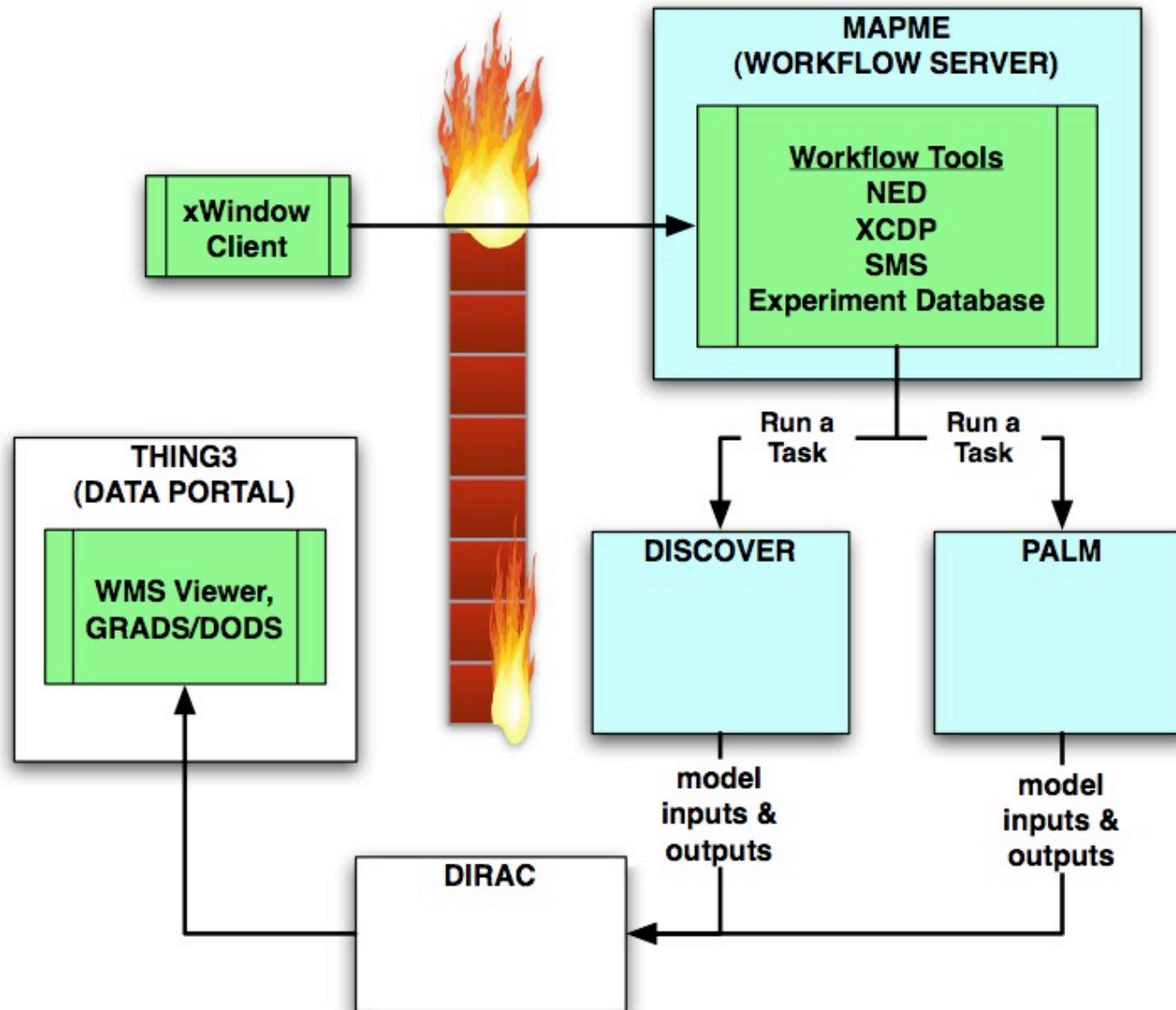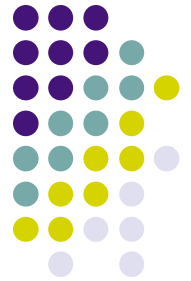 - GEOS workflow
- Discussion

Workflow Tool

A system that provides end-to-end support for setting up and running complex model experiments.

Enable users to concentrate on the scientific results rather than the system environments.

Workflow Tool Components

- **NED** (NASA Experiment Designer)
  - *Configure and submit experiments*
  - Replaces ECMWF's "prepIFS" GUI tool
  - Many features added beyond prepIFS, such as command-line execution, flexible GUI)

- **SMS** (from ECMWF)
  - *Schedule and execute experiments*

- **XCDP** (from ECMWF)
  - *Monitor and control experiments*
  - Suspend and restart tasks

- **GEOS-5 workflow**
  - Based on version of Larry Takacs' run scripts
  - Adding new features (e.g. ocean model coupling) and make easier to use

Workflow System in NCCS

- Run from single location within NCCS: "mapme"

- Connects to HPC resources to perform tasks
  - palm
  - discover
  - dirac
  - *Others*

Workflow Tool Components

Searchable Experiment DB
- **Configuration Template** for GEOS-5 Experiment

Version-Control Repository
- **Base Scripts** for GEOS-5 Experiment

NED (Configuring)
- **Configuration** for GEOS-5 Experiment

XCDP (Monitoring)

SMS (Scheduler)

Workflow for GEOS-5 Experiment

NED GUI: Main Windows

NED Features

- GUI allows simple configuration of experiment workflow variables
- "Design-mode" to **create templates** for experiment configurations
- **Collaborate** by sharing configurations via XML file or searchable database
  - Re-run/use past experiments
  - Share with other users
- **Compare configurations** for changes
- **Version-controlled scripts**
  - Offer development branches
  - Automatic workflow updates

Configuration difference highlighted
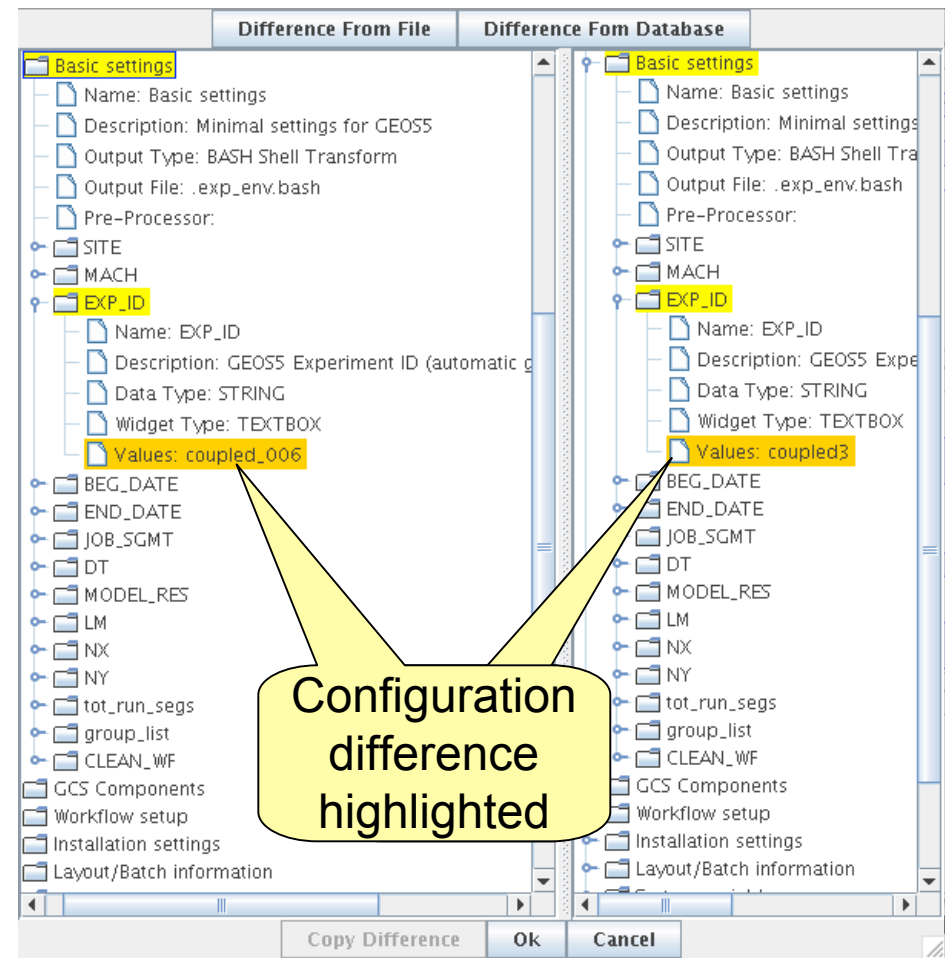
NED Features, cont.

- **Search** capability:
  - Inside experiment configurations
  - Or search the whole collection of previously run experiments
- **Automatically check** for valid settings before running
- Will be working on web application
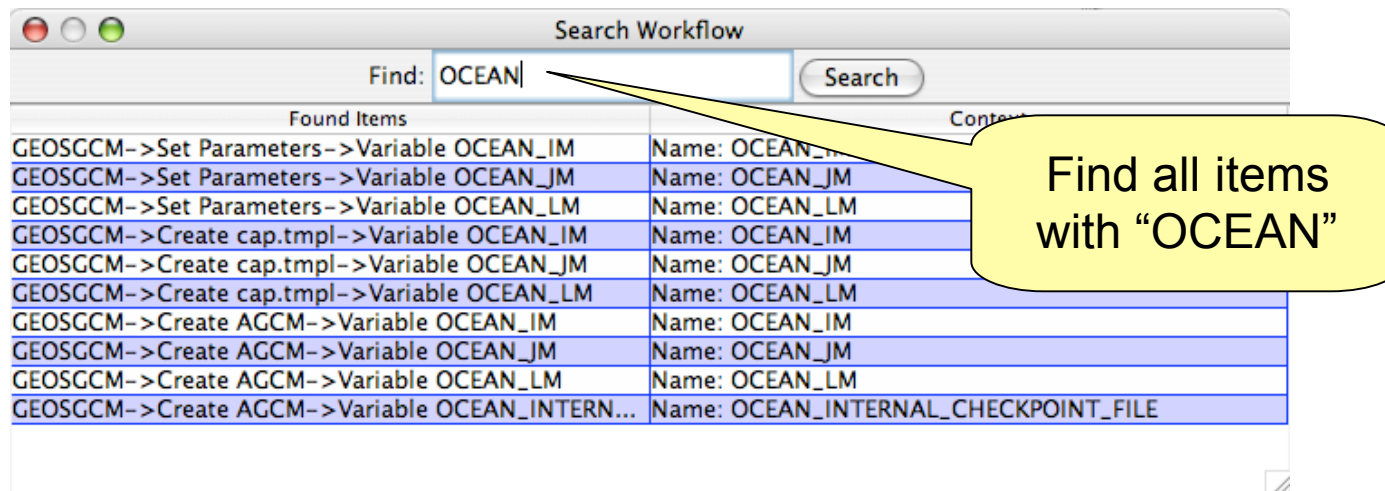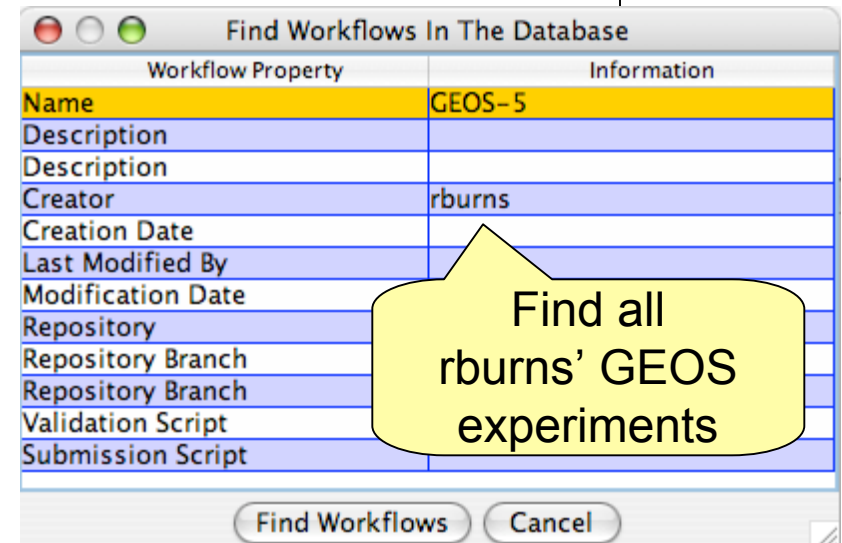
Find all rburns' GEOS experiments

Find all items with "OCEAN"

Modeling Guru

https://modelingguru.nasa.gov

Community:
"MAP Modeling Environment Workflow Tool"

- Contains resources (e.g. GEOS workflow tutorial)

- Suggestions/comments welcome to be posted to the community

Tool and Workflow Development

- Iterative & incremental development
- Feature requests/issues added to backlog
- Beta releases
- Enhance both tools and GEOS workflow

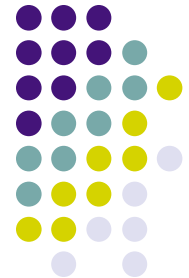|	A	B	C	D	E
1	MAPME Workflow Iteration Backlog				
2	Iteration: 2/13/08				
3	Name	Owner	Est.	Prty	Notes
8	NED - move logging to a specific directory /home/workflow/log	SF		4	RB - will be required for restricted (i.e. reduced risk of corruption) user environment
9	Bug: working dir month off by one	SF		4	RB - more difficult to find experiment, also use filler zeros for digits (i.e. jan is "_01_" not "_1_"); Also remove "tmp_" from name
10	GEOS WF history output changes failing	MD		3	BP - HISTORY is fixed at present. Requires some re-design. Can we use the HISTORY template?
11	GEOS WF - Add options for vertical levels and top of level	MD		1	RR - DEFERRED -- Difficult to implement, lack of GMAO support
12	GEOS WF: Swap MOM4 ocean model and ocean data model	CC		1	RR - ROSES proposers demonstration
13	GEOS WF: Report on how to swap physics components from GMAO to NCEP	CC	3-10?	3	RESEARCH ONLY
14	GEOS WF: Report on how restarts might be made more integrated with workflow	CC		3	
15	Minimal system restrictions can allow users to corrupt tool	RB	0.5-?	2	RB - creating two groups - dev & user -- Update: defined and requested changes, but waiting until after the 15th Demo
16	Test Beta 2 Release	All		1	
17					
18	Previously Completed				
19	Investigate SMS integration with TotalView	SF	0.5	4	GM - reference email from Gail for ECMWF documentation
20	Add resolution field to GEOS WF to replace dimensions	MD	0.5-1	2	dim variables (all of them) should be replaced with single dim selection 2,1,1/2,1/4 degree selections -- move dim variables to script conditional
21	Bug: Terminal window from mapme may report "X11 connection rejected because of wrong authentication"	RB	0.5-?	2	BP - A few of us have seen this now. Recommend reboot end-user system. Likely an X11 quirk that happens on a number of systems. Letting go on hold for now.
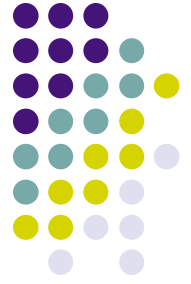
Next Steps

- **On-going Tool Development**
  - Continuing to support beta users
  - Releasing beta versions of tools & GEOS workflow
  - Adding new features to tools & GEOS workflow
  - Other plans include expansion to NAS and making tools available as a web application

- **ROSES Support**
  - Dialog between SIVO, GMAO & HQ
 - Plan new features to make available to proposers

Next Steps, cont.
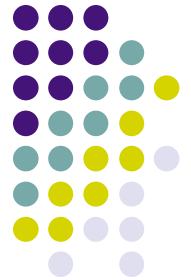
Coupled ocean runs in next beta release

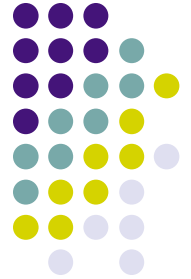| Name	Description	Data Type	Values
OCEAN_MODEL	Type of ocean model	STRING	MOM4
OCEAN_RAD	Ocean radiation model	BOOLEAN	☐
BIO_CHEM	Biochemistry	BOOLEAN	☐
SEA_ICE	Sea ice	STRING	CICE

- ***Collaboration with you (GMAO)***
  - Solicit beta testers to evaluate and suggest improvements:
    - *What features would like to see?*
    - *How can we improve it?*
  - Tool training and assistance for using/designing workflows
  - Collaborate on improvements for running GEOS and managing data
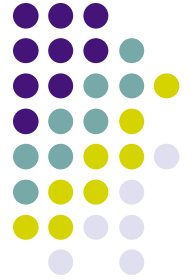
Demos
NED
GEOS-5 GCM

Discussion

BACKUP SLIDES

Workflow System in NCCS